Development of X-ray multilayer gratings with high resolution and high efficiency

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High resolution X-ray diffraction optics with high efficiency are the key components to probe the structure and dynamics of matters. Combining X-ray multilayers with high quality gratings can further improve the spectral resolution and efficiency/throughput of the diffraction optics to serve the advanced applications like high resolution x-ray spectroscopy and imaging [1]. A unified analytical theory and different types of multilayer gratings are under development in our lab, particularly the blazed multilayer grating (BMG). The unified analytical theory presents consistent results with numerical methods with much faster calculation speed, which also help reveal the influence of the grating structure on its optical properties [2]. The blazed grating substrate is produced by wet anisotropic etching of a single crystalline silicon. This method can generate sharp triangular profile with atomically smooth surface which is very important for achieving the high efficiency in theory [3]. Progress in both theory and experiments will be discussed here.

References

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